

Gila River Navigability

Presentation to ANSAC

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Definition of Navigability

- A.R.S. § 37-1101(5)

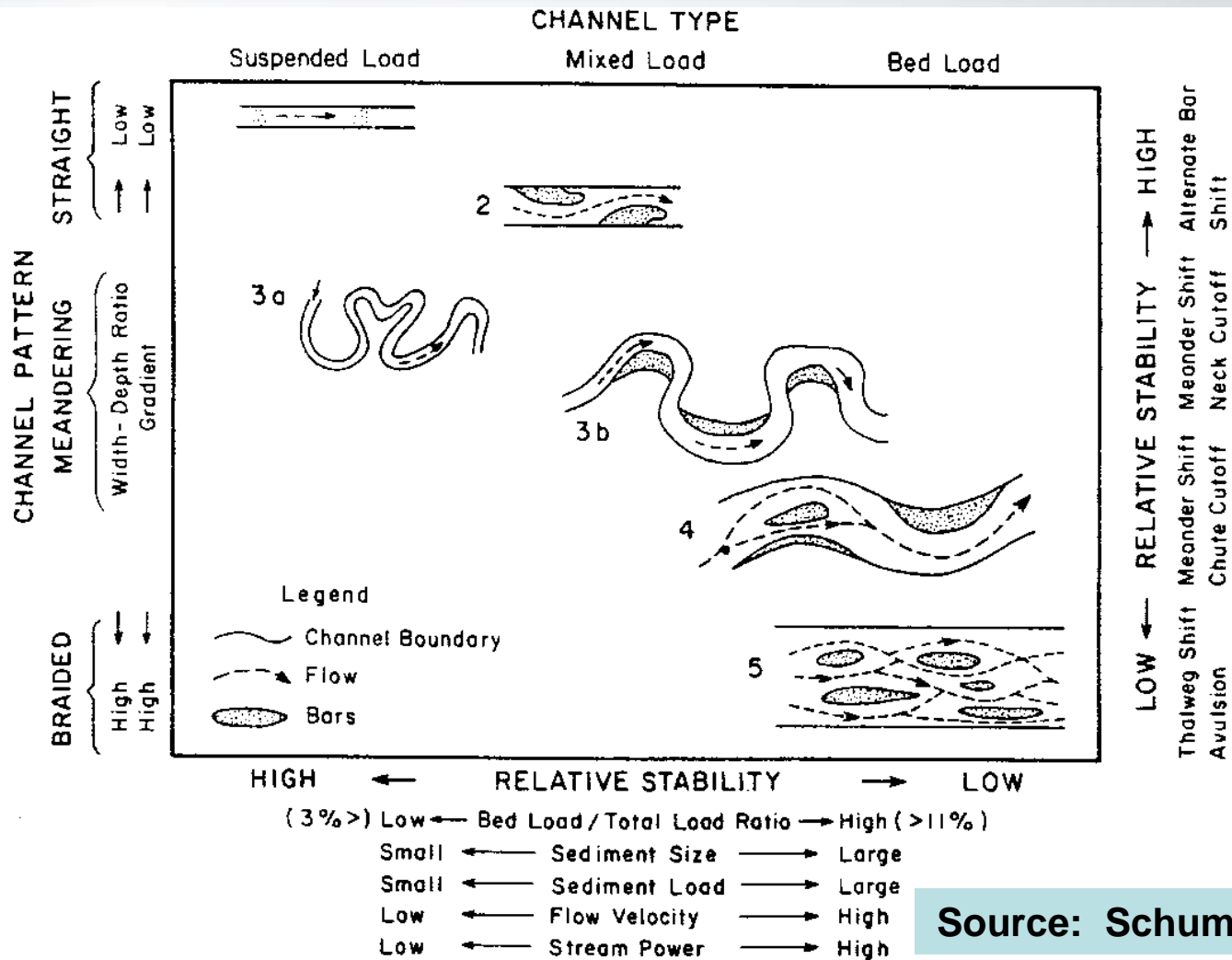
“Navigable” or “navigable watercourse” means a watercourse that was in existence on February 14, 1912, and at that time was used or was susceptible to being used, in its ordinary and natural condition, as a highway for commerce, over which trade and travel were or could have been conducted in customary modes of trade and travel on water.

Definition of Navigability

■ PPL Montana

- *...evidence [of present-day, primarily recreational use] must be confined to that which shows the river could sustain the kinds of commercial use that, as a realistic matter, might have occurred at the time of statehood.*

Channel Classification Relevant to Gila River Navigability



Examples of Channel Types

Single-thread “Navigable” Channel
U.S. v Utah

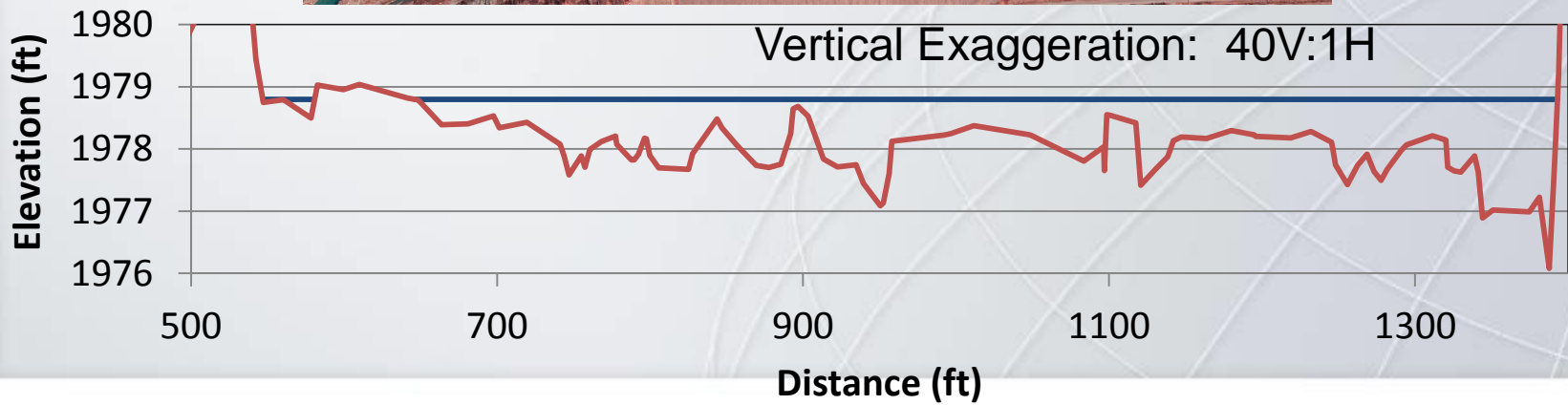
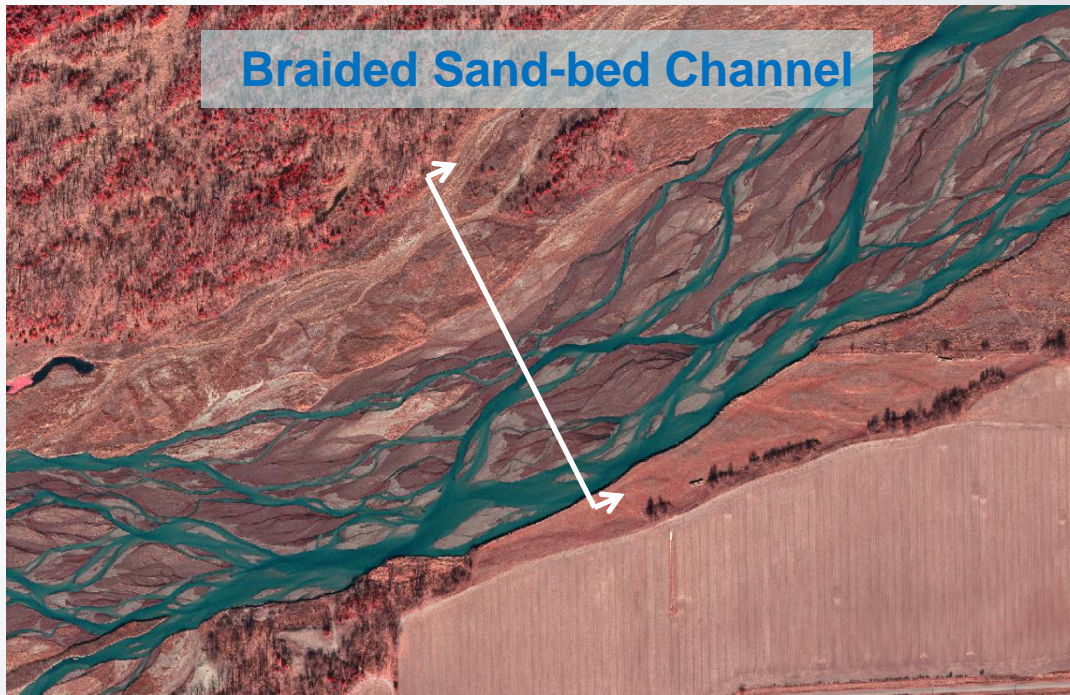


Examples of Channel Types

Single-thread Meandering Channel



Examples of Channel Types



Examples of Channel Types

Braided Cobble-bed Channel



Examples of Channel Types

Braided Cobble-bed Channel



Channel Pattern IS Relevant to Navigability

- Braided channels:
 - Wide, shallow cross section
 - Multiple, unstable (i.e., shifting) channels
 - NOT conducive to boating



Channel Pattern IS Relevant to Navigability

- United States v Utah (283 U.S. 85)

The principal impediment to navigation is (*sic*) found is shifting sandbars....

Gila River Dynamics

- Mid-1800s:

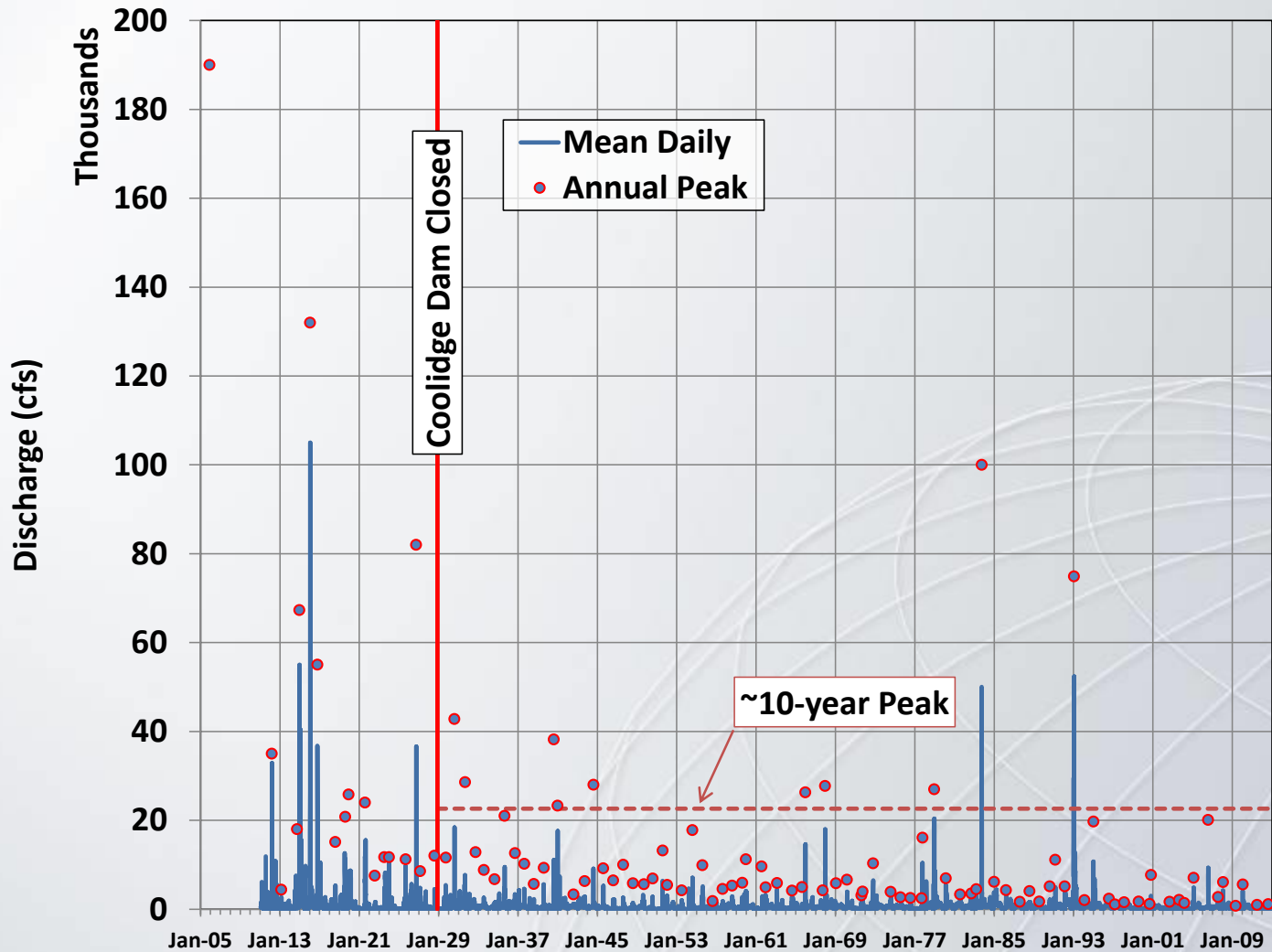
- Gila River may have been single-thread channel during periods of extended low flow; however...

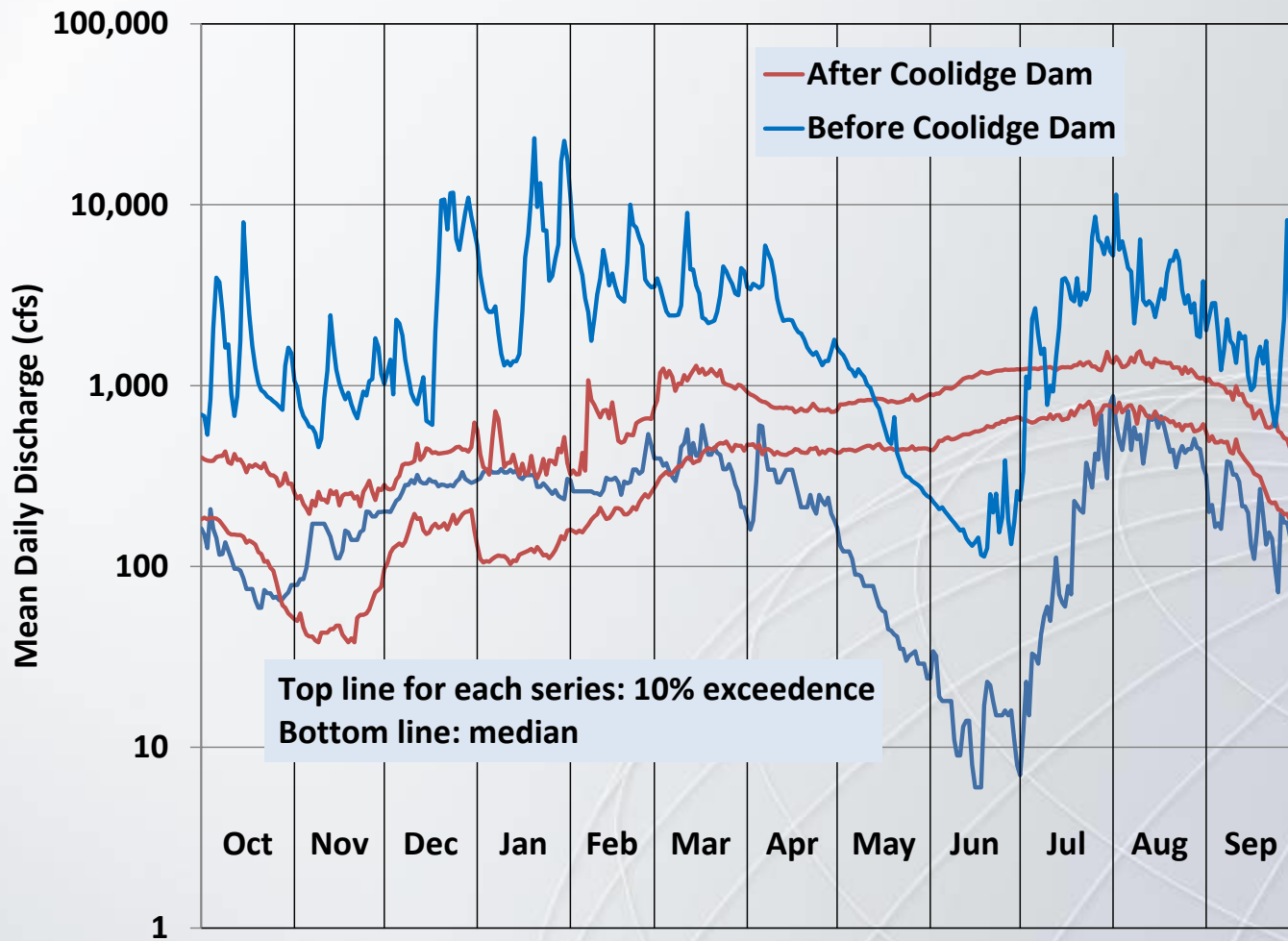
- Strongly flood driven:

Periods of increased flood frequency are more likely to be associated with wide, braided channel conditions on the Gila River (Burkham, 1972; Huckleberry, 1993b). Huckleberry (1996), p 4

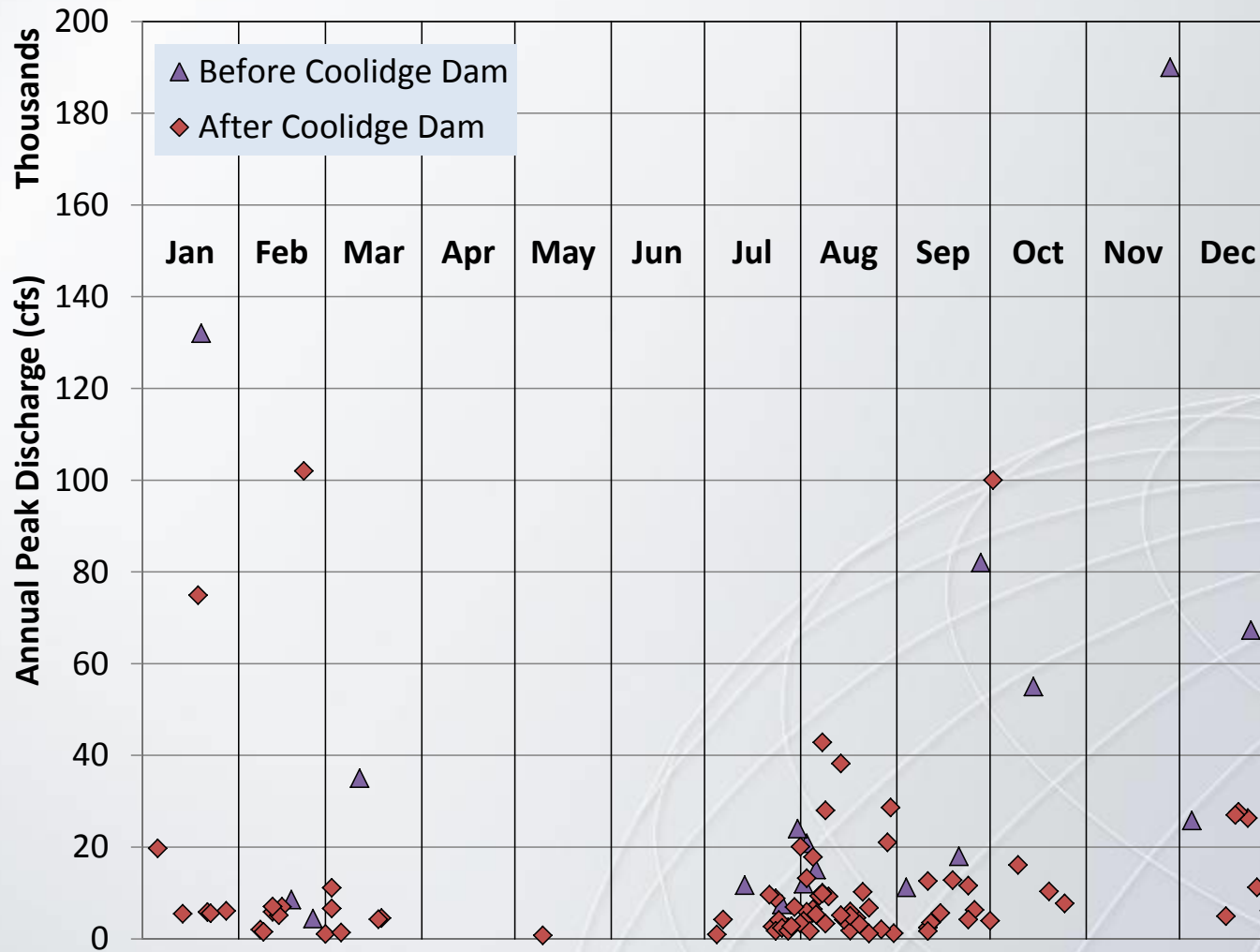
The channel changed its geometry when the sustained flow of the floods of January, 1993 converted the compound channel above Pima Butte into a single, wide, braided channel. Huckleberry (1996), p 8

Gila River at Kelvin Flows

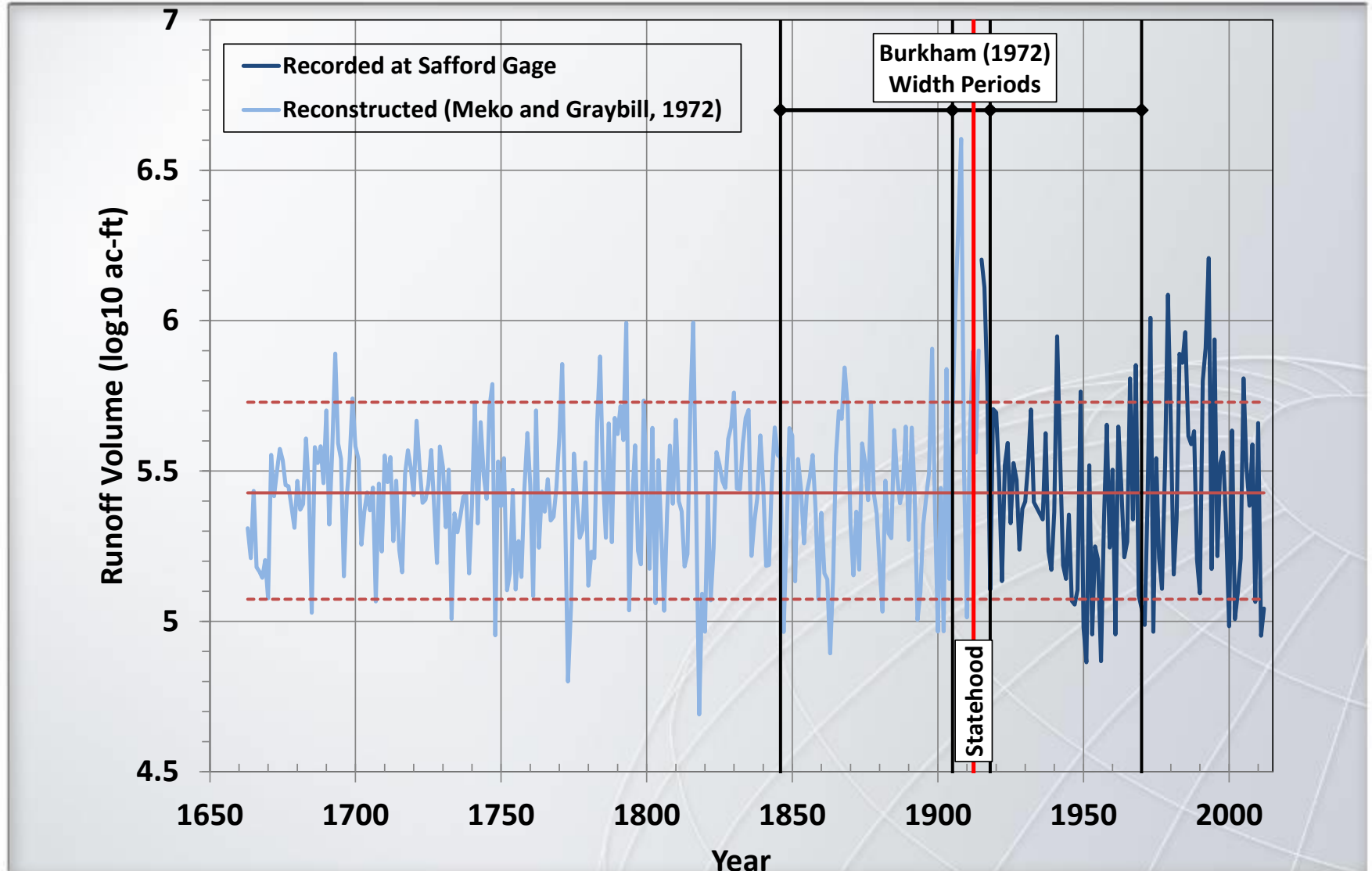




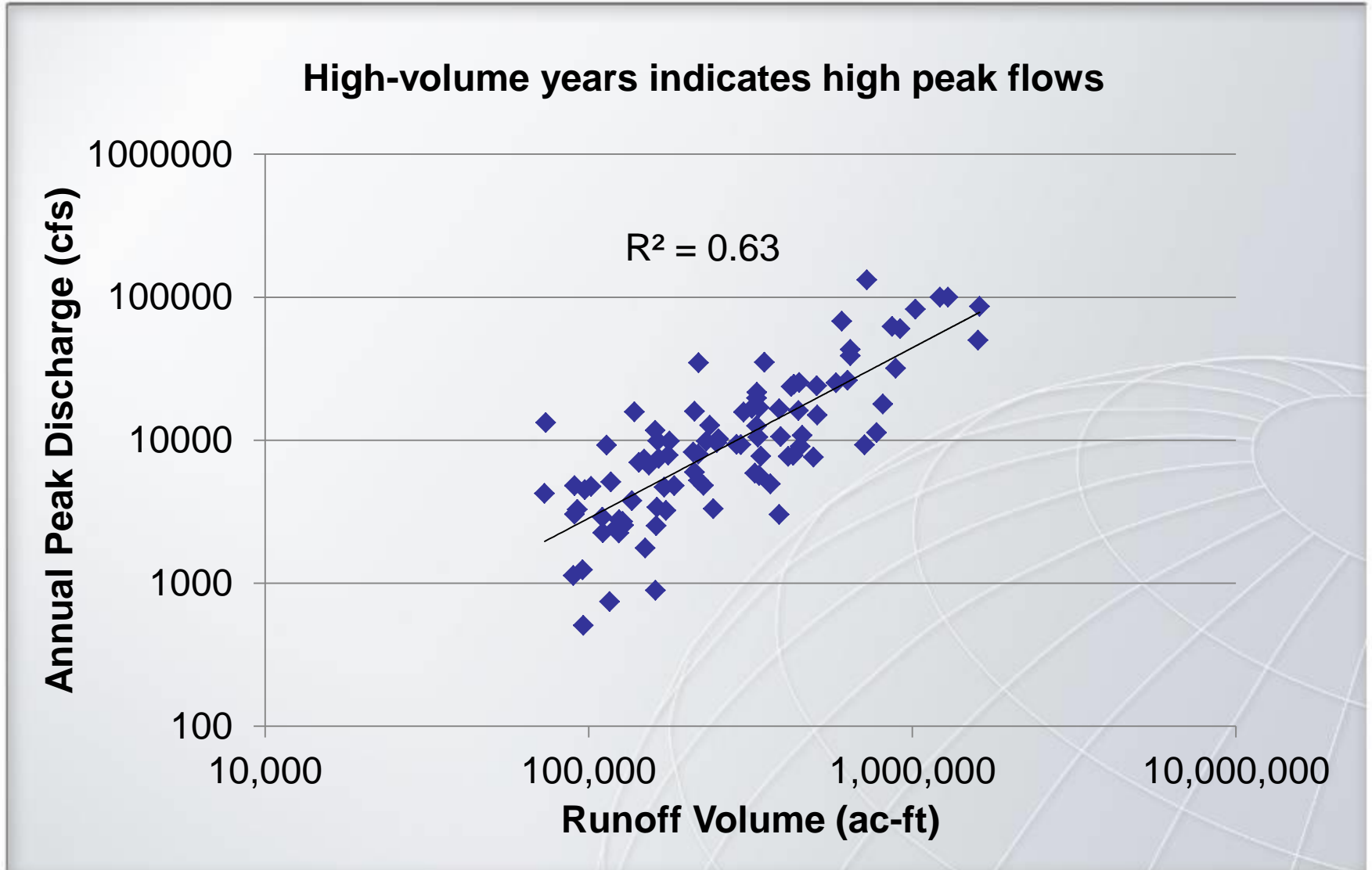
Annual Flood Peaks: Snowmelt and Monsoon



Similar Variability in Annual Volume Pre- and Post-statehood



Annual peak is correlated with annual volume

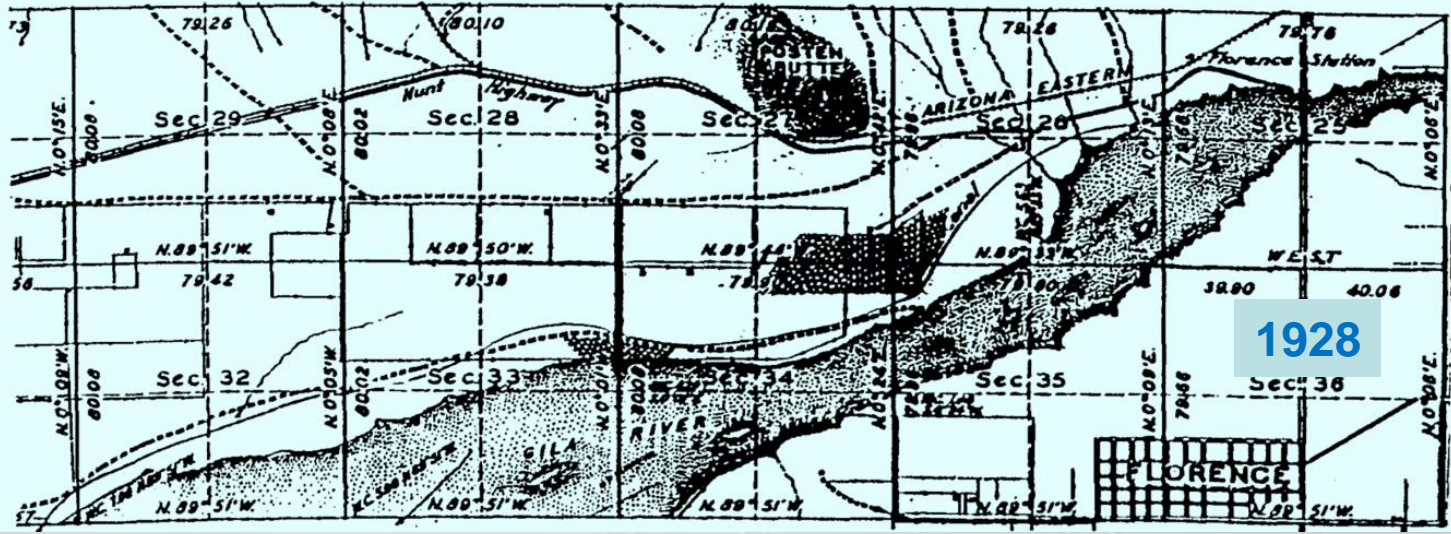
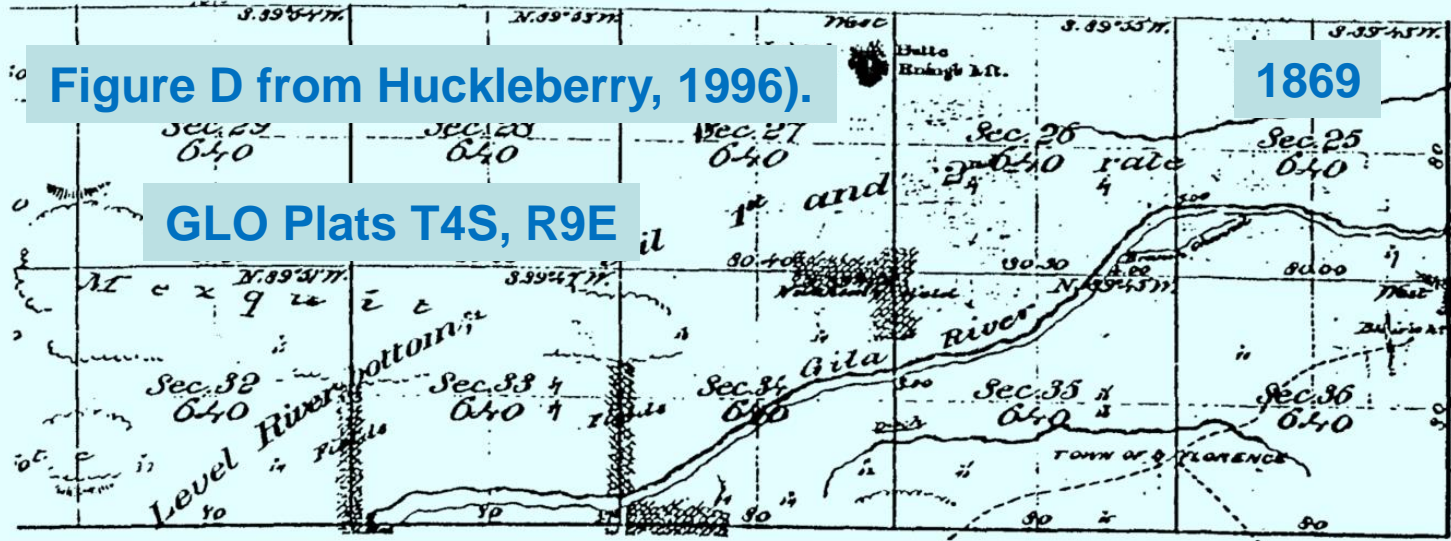


Flood-induced Changes in Channel Width

Figure D from Huckleberry, 1996).

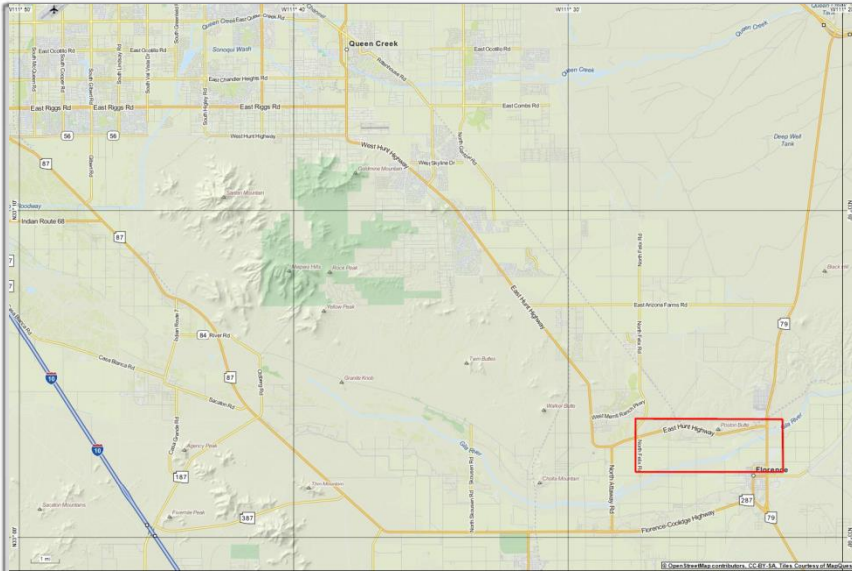
1869

GLO Plats T4S, R9E

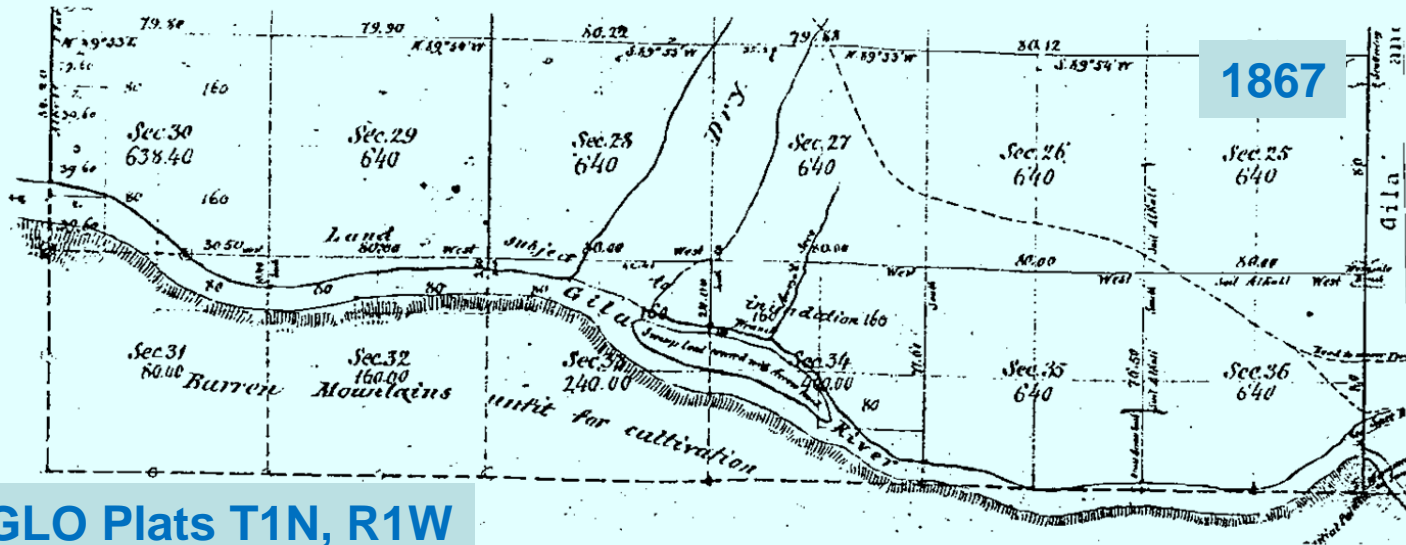


1928

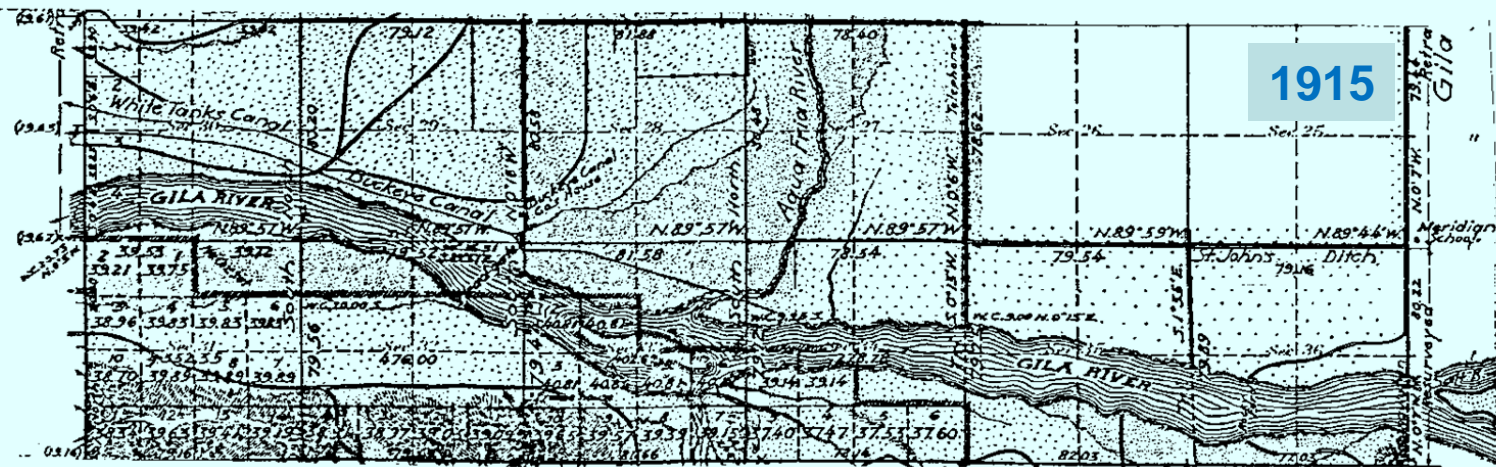
Location of GLO Plat (April 24, 2013)



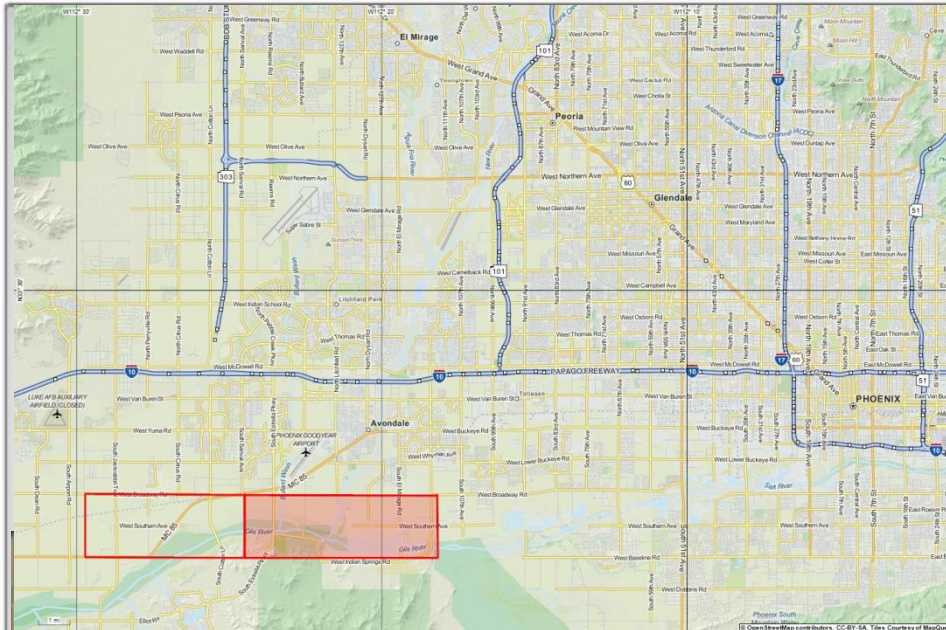
Flood-induced Changes in Channel Width



GLO Plats T1N, R1W



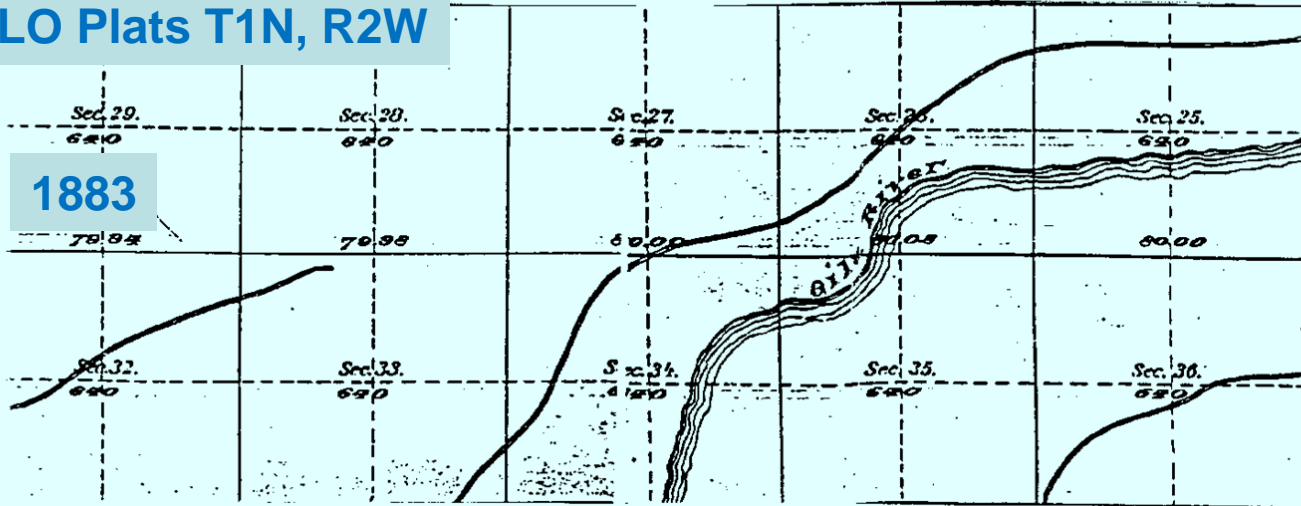
Location of GLO Plat (March 7, 2014)



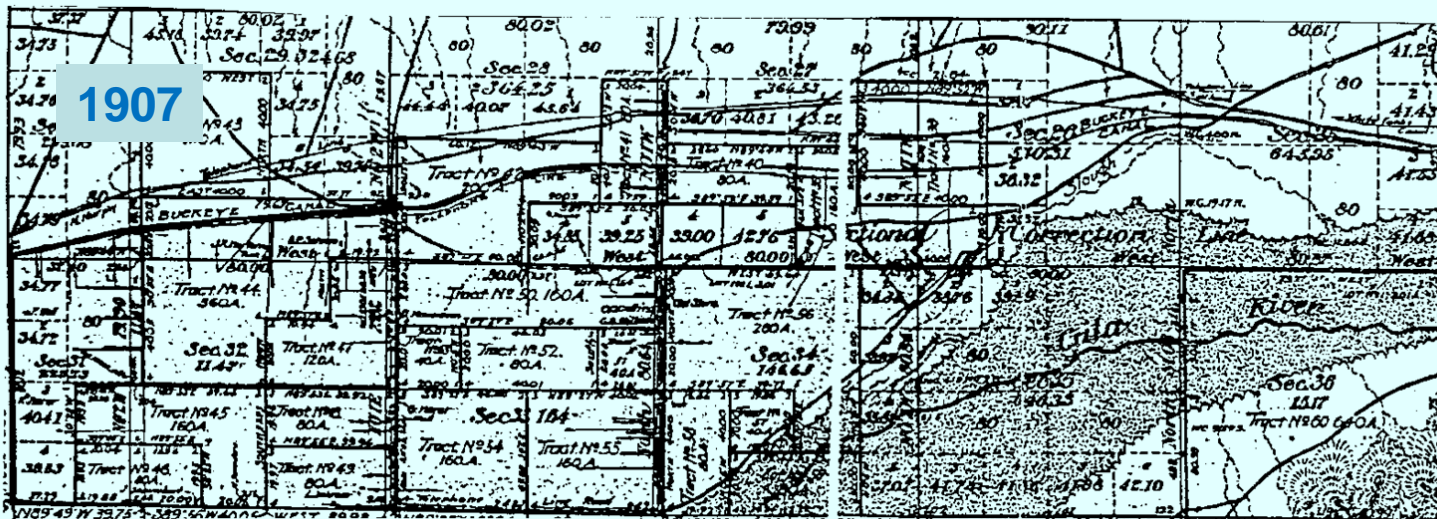
Flood-induced Changes in Channel Width

GLO Plats T1N, R2W

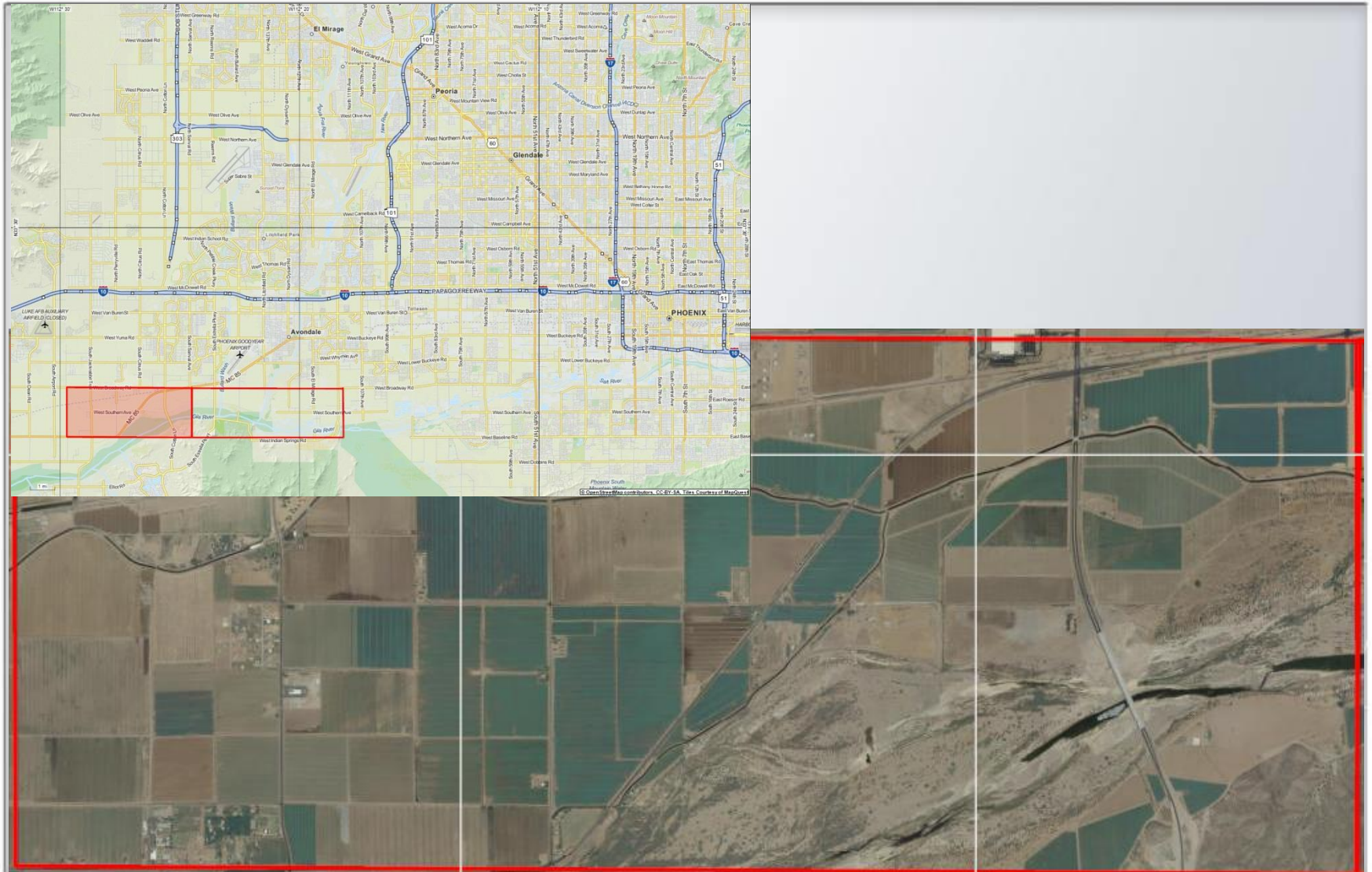
1883



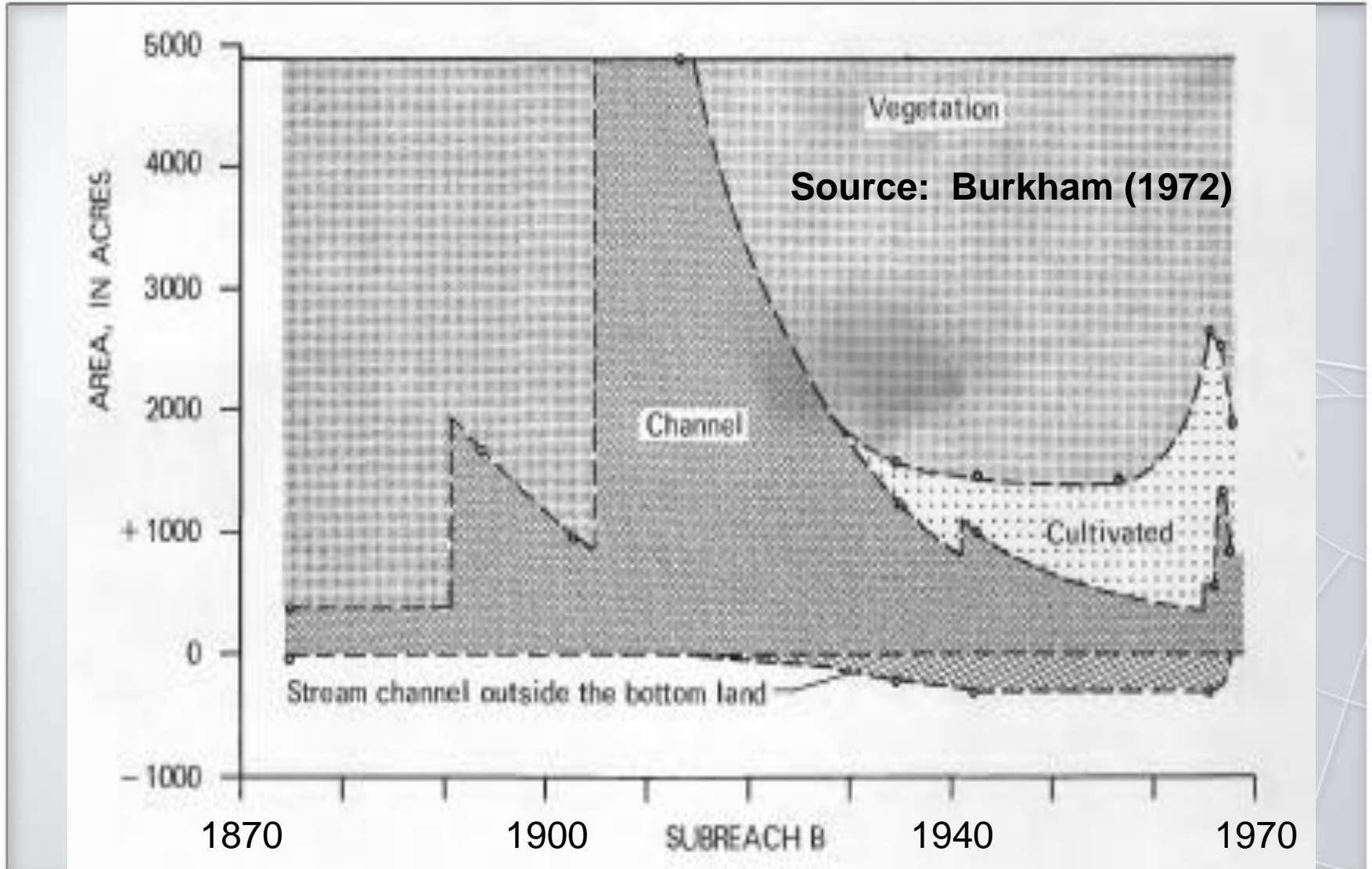
1907



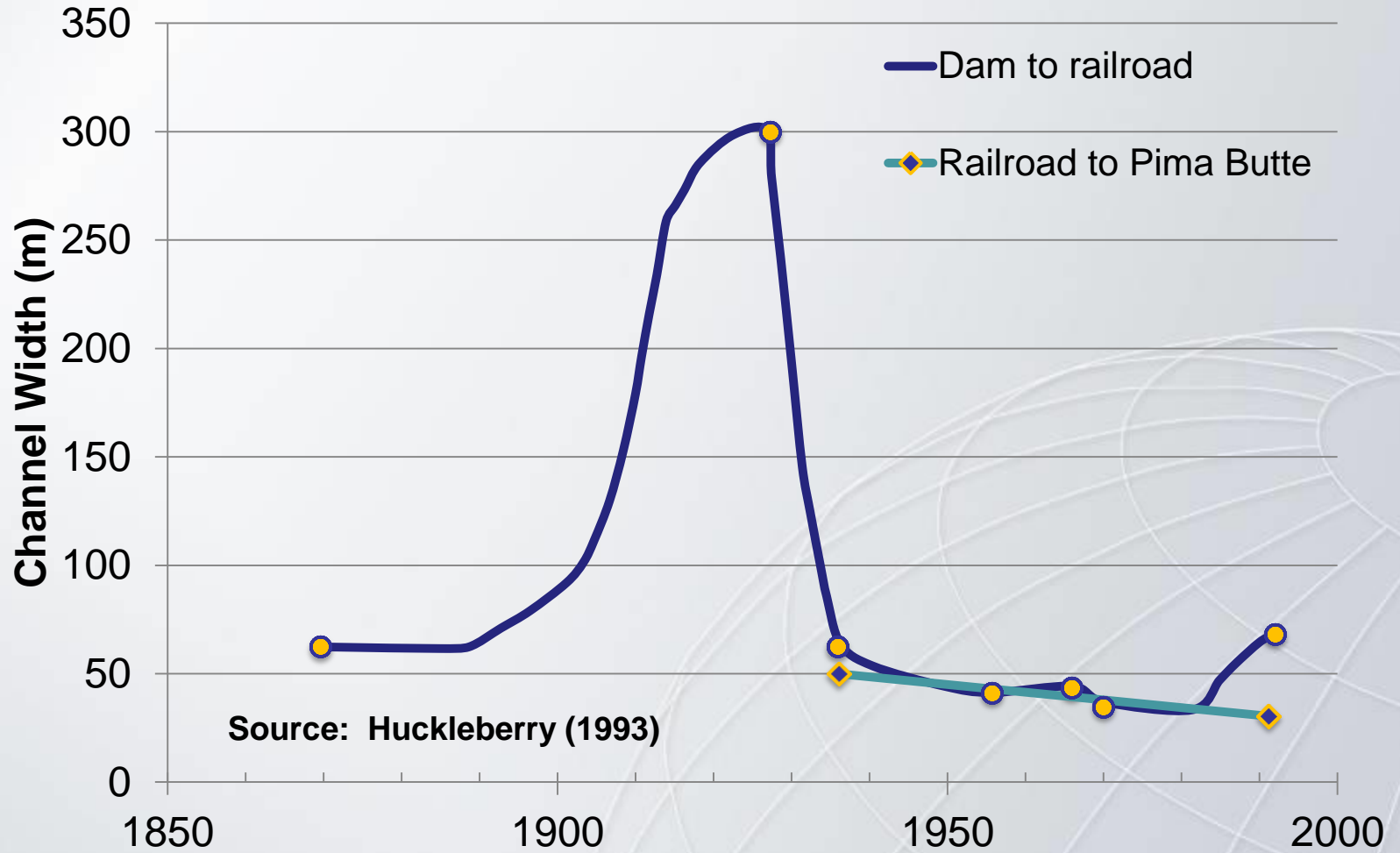
Location of GLO Plat (March 7, 2014)



Historical Changes in Gila River (Pima to San Carlos Res)



Channel Width Change, Middle Gila River



Summary of Opinions

■ Mid-1800s:

- Portions of Gila River had single-thread channel lined with thick stands of woody riparian vegetation.
- It may have been possible to float a small boat in some reaches under some flow conditions

■ 1895 to 1916:

- Large floods scoured vegetation, eroded the banks, widened the channel,
- Gila River developed wide braided planform.

Summary of Opinions

- Early-1900s, including date of statehood:
 - Extensive reaches were dry; carried little or no flow except during flooding.
 - Braided planform and low to non-existent flows would have made commercial navigation impractical.
 - During flood periods, navigation also impractical due to hazardous conditions, debris, uncertain and unstable channels.
- Prior to mid-1800s:
 - Reconstructed flow records show mid-1800s unusually dry
 - Large floods routinely occurred in the ordinary and natural condition of the Gila River

Summary of Opinions

The Gila River was NOT used nor susceptible to being used, in its ordinary and natural condition, as a highway for commerce, using customary modes of trade and travel on water at the time of Arizona's statehood.